

REMARKS

Claims 51 and 62-64 have been amended. Claims 61 and 70 have been canceled. Claims 71 and 72 have been added. Claims 51-60, 62-69, and 71-72 are now pending. The Title of the Invention has been amended to correspond more closely to the pending claims. Applicants reserve the right to pursue the original claims and other claims in this and other applications. Applicants respectfully request reconsideration of the above-referenced application in light of the amendments and following remarks.

At the outset, Applicants acknowledge with appreciation that claims 56, 61-63, and 70 are in condition for allowance if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Accordingly, the allowable subject matter of dependent claim 61 has been incorporated into independent claim 51. Claims 52-60 and 62-63 depend from independent claim 51 and should also be in condition for allowance, along with independent claim 51. The allowable subject matter of dependent claim 70 has been incorporated into independent claim 64. Claims 65-69 depend from independent claim 64 and should also be in condition for allowance, along with independent claim 64.

Applicants also respectfully submit that newly added claims 71 and 72, contain allowable subject matter over the prior art of record, for at least the reasons set forth below.

The prior art of record does not teach or suggest a method of forming a semiconductor memory device comprising, *inter alia*, "forming a first electrode . . . forming a metal layer over said first electrode; forming a layer comprising a chalcogenide material . . . irradiating said metal layer to diffuse at least a portion of metal ions from said metal layer into portions of said chalcogenide layer, wherein said

chalcogenide layer comprises a first region with metal ions diffused therein and a second region without a substantial amount of metal ions diffused therein; removing said second region of said chalcogenide layer . . . and forming a second electrode over at least a portion of said remaining first region of said chalcogenide layer," as claim 71 recites.

Similarly, the prior art of record does not teach or suggest a method of forming a semiconductor memory device comprising, *inter alia*, "forming a first metal layer . . . forming a second metal layer over said first metal layer; forming a chalcogenide layer over said first and second metal layers; diffusing a portion of said second metal layer into a portion of said chalcogenide material to form a first and second region, wherein said first region comprises metal ions from said second metal layer; and removing said second region from said chalcogenide material," as claim 72 recites.

In particular, the prior art of record does not disclose or suggest a metal layer formed over a first electrode or a first metal layer, with a chalcogenide layer formed over the metal layer. In U.S. Patent No. 6,418,049 ("Kozicki"), FIG. 5A merely illustrates bottom electrode 530, ion conductor 540 formed over bottom electrode 530, and top electrode 560 formed over ion conductor 540. Applying a voltage between bottom electrode 530 and top electrode 560 results in a nonvolatile dendrite 570.

Kozicki, however, does not disclose "forming a first electrode . . . forming a metal layer over said first electrode; [and] forming a layer comprising a chalcogenide material," as claim 71 recites, or "forming a first metal layer . . . forming a second metal layer over said first metal layer; [and] forming a chalcogenide layer over said first and second metal layers," as claim 72 recites. There is no disclosure or suggestion of a metal

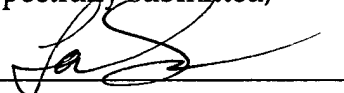
layer in Kozicki's structure that is formed over bottom electrode 530, much less a chalcogenide layer formed over bottom electrode 530 and a metal layer.

Moreover, there is no teaching or suggestion in Kozicki of a method in which the "chalcogenide layer comprises a first region with metal ions diffused therein and a second region without a substantial amount of metal ions diffused therein, [and] removing said second region of said chalcogenide layer," as claim 71 recites, or a method in which the chalcogenide layer has "a first and second region, wherein said first region comprises metal ions from said second metal layer; and removing said second region from said chalcogenide material," as claim 72 recites. Neither Kozicki nor the prior art of record discloses removing a second region that does not have metal ions diffused therein. For at least these reasons, claims 71 and 72 should be allowable over the prior art of record.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to review and pass this application to issue.

Dated: March 11, 2005

Respectfully submitted,

By 

Thomas J. D'Amico

Registration No.: 28,371

DICKSTEIN SHAPIRO MORIN &

OSHINSKY LLP

2101 L Street NW

Washington, DC 20037-1526

(202) 785-9700

Attorney for Applicants